REMARKS

Claims 1-12 are pending in the present application.

Restriction Requirement

The Examiner has required restriction between Groups I – II as set forth on page 2 of the Office Action.

Applicants elect with traverse, Group II, claims 10-12. The requirement is traversed for the following reasons:

As will be evidenced below, the process and apparatus of the present invention are so closely intertwined and mutually dependent upon each other, such that the process could not be conducted in a different apparatus and the apparatus is unique to the Applicant's particular process.

Chocolate is a suspension of solids comprising particles of cocoa, crystal sugar and milk, surrounded and linked by fat (cocoa butter). The flavor and texture of the chocolate mixture is based on chemical reactions on the surface of said solids. In order to promote said reactions, the presence of mechanical loads, such as contact, pressure and shear forces, is made necessary and is the direct result of the Applicant's specific apparatus.

The mixing process carried out in liquid chocolate mass (30% - 36% total fat) is not effective enough because the solid particles are surrounded by fat which insulates the surface area thereof and prevents an effective contact therebetween. The dry conch process is a process in which mechanical forces are applied in the chocolate dry mass mixture (10% - 26% total fat). Such process requires sufficiently fat-free surface areas so as to allow a close contact between the particles. Such surface areas are produced by the present apparatus.

Thus, the process claimed in the present application is based on a special design of paddle arms (10, 11) and on a relative movement between articulated (11) and fixed (10) paddle arms,

allowing an adequate contact of the surfaces. Due to this intensive mechanical work, a complete chocolate flavor is attained. Therefore, the "U" shape conch of the present invention has a paddle arm construction (10, 11) having a special shape which allows processing the chocolate raw material without any kind of pre-treatment. This means that expensive equipment, such as a vacuum chamber, are not required.

The present process starts with the mixture of conventional chocolate raw material. These ingredients are fed directly into a "U" type conch chamber (27) where the paddle arms (10, 11) perform the mechanical work on the unrefined ingredients, providing shear, contact, pressure and rolling movements in the dry mixture. During the dry-conching step, the fixed paddle arms (10) provide filtered and heated air injection (14) through tubes (10, 26). This device is responsible for blowing and mixing filtered hot air into the chocolate dry mixture and removing the moisture, astringency, acidity and flavors extraneous to cocoa. During the dry conch step, the filtered hot air is mixed into the dry mixture by the special dynamic movement from the articulated paddle arms (11).

What is disclosed by the present invention is the refining and wet-conching of the chocolate mass after the dry-conching step takes place. The unrefined dry chocolate mass is completed with the total amount of fat being normally 30% - 36%, and is liquefied and refined by milling in the wet system by means of a special closed horizontal water jacket ball mill (21) provided with a fast flow pumping system, and the chocolate liquid mass is recirculated until it achieves the final desired finesse (16 – 30 microns).

THE BASIC DIFFERENCES BETWEEN THE PRESENT INVENTION AND US PATENT NO. 3,663,231

The Examiner correctly indicates that groups I and II are generically linked by the U-type conch. However, as will be demonstrated hereinbelow, the special technical features linking Group I and Group II are not known or evidenced by US 3,663,231. Table 1 summarizes the differences.

TABLE 1

COMPARISON	1 - CONCH OF THE PRESENT APPLICATION	2 - EQUIVALENT ELEMENT OF US 3,663,231	REFERENCES
No. of distinct elements	A single U conch apparatus	A group of distinct apparatuses	1 – page 12, line 10, to page 15, line 2; 2 – figure 1.
Kind of processed products	Chocolate raw material (sugar, cocoa, powdered milk)	Pre-mixed and refined chocolate mass	1 – page 9, lines 17-24; 2 – abstract.
Unit operations carried out by the equipment	a) batch mixing; b) heating and cooling; c) dry-conching; d) injection of filtered air; e) injection of filtered air; d) wet-conching.	a) continuous liquefying conching; b) compression; c) shredding; d) vibration; e) conveyance.	1 – page 9, lines 17-24; 2 – abstract.
Type of processing	Batch	Continuous	1 – page 9, lines 17-24; 2 – abstract, lines 1-10.
Motion of the equipment	Motion of equal and fixed paddles for injection of air into the mass;	Several different elements, each provided with movable parts and different chambers for specific	1 – whole description; 2 – whole description;
	Mass placed in a single chamber to promote batch mixing, dry-conching and wet-conching	actions	
Basic concept	An improved classical batch chocolate processing	Distinct unitary operations	1 – page 9, lines 17-24; 2 – abstract.
Layout	Completely different design when compared to the classical conch and to the one of US 3,663,231	Completely different design when compared to the classical conch and to the one of the present application	1 – whole description; 2 – whole description
Driving system	Single motor	Multiple motors	1 – figures; 2 – figures.
Purpose	Batch conching of chocolate raw material	Continuous and liquefied conching of chocolate crumb, by means of compression, shredding and vibration	1 – description and figures; 2 – description and figures.

As set forth above, the U-type conch which generically links groups I and II is not specifically taught or evidenced by US 3,663,231. A detailed description of the differences between the present invention and the disclosure of US 3,663,231 is now presented.

THE DIFFERENCES BETWEEN THE PRESENT INVENTION AND US 3,663,231 – OPERATIONAL FEATURES & CONDITIONS

US 3,633,231 refers to a process for liquefying and conching refined chocolate and to a corresponding apparatus. According to the abstract thereof, *"chocolate continuously fed from refiners is continuously liquefied and conched in an apparatus consisting of a compression stage, a shredding stage, a vibration stage, a blending stage and a final conching stage arranged one after another. Each of the compression, shredding and vibration stages includes a rotary shaft extending in and along a trough and carrying blades appropriated to the function being performed. Each of the blending and final conching stages includes an upright cylindrical vessel containing a rotary gate-type blade rotatable about the axis of the vessel".*

As mentioned in column 2, lines 24 to 32 of US 3,663,231 *"It is an object of the invention to reduce the time taken for the liquefying and conching without necessarily lowering the quality of the chocolate produced, particularly in the case of chocolate of low fat contents. According to one aspect of the present invention there is provided, a process of liquefying and conching refined chocolate in which the chocolate continuously advances in liquefying and conching apparatus while being liquefied and conched therein.".* Therefore, US 3,663,231 is related to an apparatus which processes liquefied milk and chocolate crumb mass. There is no possibility of carrying out a step of dry-conching the chocolate mass. Additionally, the process of US 3,663,231 works with this refined material in a continuous fed system. Hence, there is no possibility of having a batch system with unrefined chocolate mass.

In column 3, line 25 of US 3,663,231 it is further stated that: *"In the apparatus shown, the chocolate being liquefied and conched advances continuously. From refiners 30,*

refined chocolate is continuously fed by a continuous-type conveyor 31,... " This passage corroborates the conclusions above that the step of dry-conching the chocolate mass, which is a fundamental act of the "U" conch of the present application, is not contemplated in US 3,663,231. The passage in column 6, lines 66-69, of US 3,663,231 also confirms this position.

Processes dealing with milk or chocolate crumb are well known in the art and used by many industries. Since it is an expensive process, it is not usually applicable to small or medium factories.

The powder milk or liquid milk is a mixture with sugar, cocoa mass and water. The mixture is heated to develop the Maillard reaction, providing the chocolate flavor. The mixture is then: concentrated and dried in a vacuum chamber; milled in a refining machine; and finally sent to a mixer and homogenizer chamber to complete and homogenize the formula.

The apparatus disclosed in Figure 1 of US 3,663,231 is designed to work with milk crumb raw material, usually called chocolate crumb. This means that this apparatus requires a pre-treatment of the raw material. The crumb process has the purpose of promoting Maillard chemical reactions between milk, sugar and cocoa mass diluted in water. In this case, the achievement of chocolate flavor happens before the conching step, in a vacuum chamber. Consequently, the paddle arms disclosed in Figure 1 of US 3,663,231 are not intended to exert the same function of the paddle arms (10, 11) of the present invention. Conversely to the paddle arms (10, 11) of the present application, which were designed to process chocolate mass in a dry and wet conching system, the paddle arms of US 3,663,231 rely on rheological and homogenizing aspects, and not on flavor development.

In summary, the disclosure of US 3,663,231 differs from the present invention for the following reasons:

1) US 3,663,231 discloses a continuous system, instead of the conching batch process of the present invention;

2) The conching step of US 3,663,231 is performed in liquefied chocolate refined mass, in contrast to the conching process of unrefined chocolate mass, starting with raw material. In addition, the chocolate mass of the present invention is firstly conched in a dry state process instead of a liquid state only.

3) The chocolate liquefying and conching apparatus disclosed in US 3,663,231 is physically designed to work with milk crumb. This means that a pre-treatment of the chocolate raw material (such as milk and sugar) is required prior to the conching step so as to develop flavor;

4) The present invention employs specially designed blade arms (10, 11) so as to process chocolate mass, conching chocolate in a batch system;

5) The physical measures of the conch of the present invention allow a high dry conching effect and are different from those of US 3,663,231;

6) The system of US 3,663,231 requires a vacuum chamber to dry the chocolate or milk crumb mass not required by the present invention;

7) In contrast to US 3,663,231, the present invention discloses a filtered heated air injection to remove moisture from the chocolate mass; and

8) US 3,663,231 only discloses a mechanical arrangement of an apparatus to process milk chocolate crumb, not describing the steps of the present invention.

CONCLUSION

The U-shape conch of US 3,663,231 was designed to work with chocolate mass in a continuous feeding process. Conversely, the U-shape conch of the present invention has special, articulated paddle arms (11) designed to operate in a cycle batch system, providing dynamic

movements which yields high efficiency in dry conching. For this reason alone, it can be understood that the respective U-conches are not the same, and thus nor equivalent.

Accordingly, because of the special technical features linking the process and apparatus of the present invention including the mutual dependency of the process and apparatus, it is believed that all of the claims of the present application are properly examinable in one single application, as a single invention. Furthermore, it would be unreasonable to require the Applicant to file multiple applications to protect a single invention.

Thus, reconsideration of the requirement for restriction and action on the merits of all of the claims of the present application are respectfully requested.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Joseph A. Kolasch, Registration No. 22463, at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

☑ Attached is a Petition for Extension of Time.

☑ Attached hereto is the fee transmittal listing the required fees.

If necessary, the Director is hereby authorized in this, concurrent, and future replies to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

Dated: December 23, 2010

Respectfully submitted,

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